tau-tron inc

tau-tron inc
11 Esquire Road, North Billerica, Mass. 01862
(7402-27) Tel: (617) 667-3874

MA-4

INSTRUCTION MANUAL

JHm237

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SECTION 1.

OPERATING INSTRUCTIONS

GENERAL

AC Power---Check to insure that the 115/230 VAC switch located on the rear of the Main Frame is set to the line voltage available. The fuse should be of the slo-blo type; 5A for 115 VAC or 3A for 230 VAC operation.

Signal---All input and output connectors are BNC type.

OPERATIONAL CONTROLS

Delay Control---The delay controls consist of two concentric knobs. The outer knob is the coarse delay range switch, and the inner is the vernier. The coarse control is separated into seven ranges and, in conjunction with the vernier, provides continuous adjustment from zero to ten milliseconds delay.

Duty cycle is at least 50%. If the pulse delay is in excess of the duty cycle, output signal waveform abberations will appear until the delay is decreased.

Width Control---The width controls consist of two concentric knobs. The outer knob is the coarse width range switch, and the inner is the vernier. The coarse control is separated into seven ranges and, in conjunction with the vernier, provides continuous adjustment from minimum to ten milliseconds width.

Duty cycle is at least 50%. If the pulse width is in excess of the duty cycle, output signal abberations will occur until the width is decreased.

Amplitude Control---The amplitude controls consist of two knobs, a coarse amplitude attenuator and a vernier. The attenuator is four positions, from 0 db to 12 db attenuation, and in conjunction with the vernier provides con-

tinuous adjustment from 500 mv to 5 volts amplitude.

Baseline Offset---When the baseline offset switch is in the ground position, the baseline of the output signal is at ground level. When the switch is in the variable position, control of baseline level is available by a screwdriver adjust potentiometer. Clockwise adjustment provides positive baseline offset; counter clockwise adjustment provides negative offset.

True/Complement Selection---True or complement output data is selected by a switch located on the front panel.

Single/Double Pulse Selection---When the single/double pulse switch is in single pulse mode, the output data reflects the input data, variable in width and delay.

When double pulse is selected, two pulses appear at the output. One corresponds to the channel delay, the other corresponds to the delay setting. Both of these are width variable up to at least 50% of the delay setting.

SECTION 2.

PRINCIPLES OF OPERATION

INPUT AND DELAY (Figure 3)

The RZ data input is applied to a differential amplifier level converter to transform the input signal to ECL levels. Then it is reshaped to form a 4 to 5 ns wide pulse and is applied to the delay control circuitry.

The delay control circuit delays the input data from 0 to 10 ms in seven ranges with vernier adjustment. Basically, the delay control circuit consists of a differential amplifier, a tunnel diode bistable flip-flop and an RC delay circuit. The RC time constant is determined by the seven position rotary switch/potentiometer located on the front panel.

In operation, the data signal momentarily alters the differential amplifier output causing the bistable to switch states. The flip-flop output to the second differential amplifier input via an RC slope generator. When the feedback voltage exceeds a fixed threshold, the diff/amp output momentarily changes, causing the bistable to reset. The bistable edge corresponding to the reset is differentiated and forms the delayed data pulse.

The maximum delay duty cycle of the circuit is at least 50%. If the pulse delay is in excess of the duty cycle, output signal waveform abberations will occur until the delay is decreased.

When the Double Pulse switch is on, a reference pulse is OR'ed with the delayed trigger pulse at the output of the delay circuit, producing a pulse fixed in time and a variable delay pulse.

WIDTH (Figure 4)

Width control is accomplished by operating on the delayed data pulse. The width of the pulse is continuously variable from approximately 5 ns to 10 ms. The width control circuit is similar to the delay control circuit in that it is composed of a differential amplifier with a tunnel diode bistable element and an RC slope generator with time constants selected by the rotary switch/ potentiometer located on the front panel.

In operation, the delayed data signal momentarily alters the diff/amp output cuasing the bistable to switch states. The feedback ramp signal cuases the inverse event to occur, producing a pulse of variable width.

TRUE/COMPLEMENT SELECTION (Figure 4)

The true and complement width signals are fed into two wire OR'ed ECL gates. The DATA/$\overline{\text{DATA}}$ switch on the front panel enables the desired output to be transfered to the Power Amplifier.

POWER AMPLIFIER (Figure 5)

The width signal is passed into the preamplifier of the power amplifier. The purpose of the pre-amp is to create complementary outputs from the width input with extremely fast (1 ns) edges. These outputs drive the power amplifiers.

The pre-amplifier produces voltage gain after passing the buffer current amplifier, the signals are applied to the output amplifier stage where true and complementary outputs are generated by a current-mode amplifier providing over 100 ma, short circuit current or +5 volts into 50 ohms. Open circuit voltage is +12 volts maximum. The source impedance is approximately 50 ohms. Vernier amplitude variation is provided by the bias current sources.

The power amplifier output is available to drive a step attenuator providing an additional 12 db of attenuation on amplitude. The attenuator output drives a d.c. offset current source which is isolated from the signal by a low pass filter. This current source is controllable by a front panel screwdriver adjustment and results in ±3 volt offset when driving 50 ohms. The grounded/variable baseline switch disables the potentiometer in the ground position and puts a fixed bias on the offset current source to hold the baseline fixed at 0 volts.

SECTION 3.

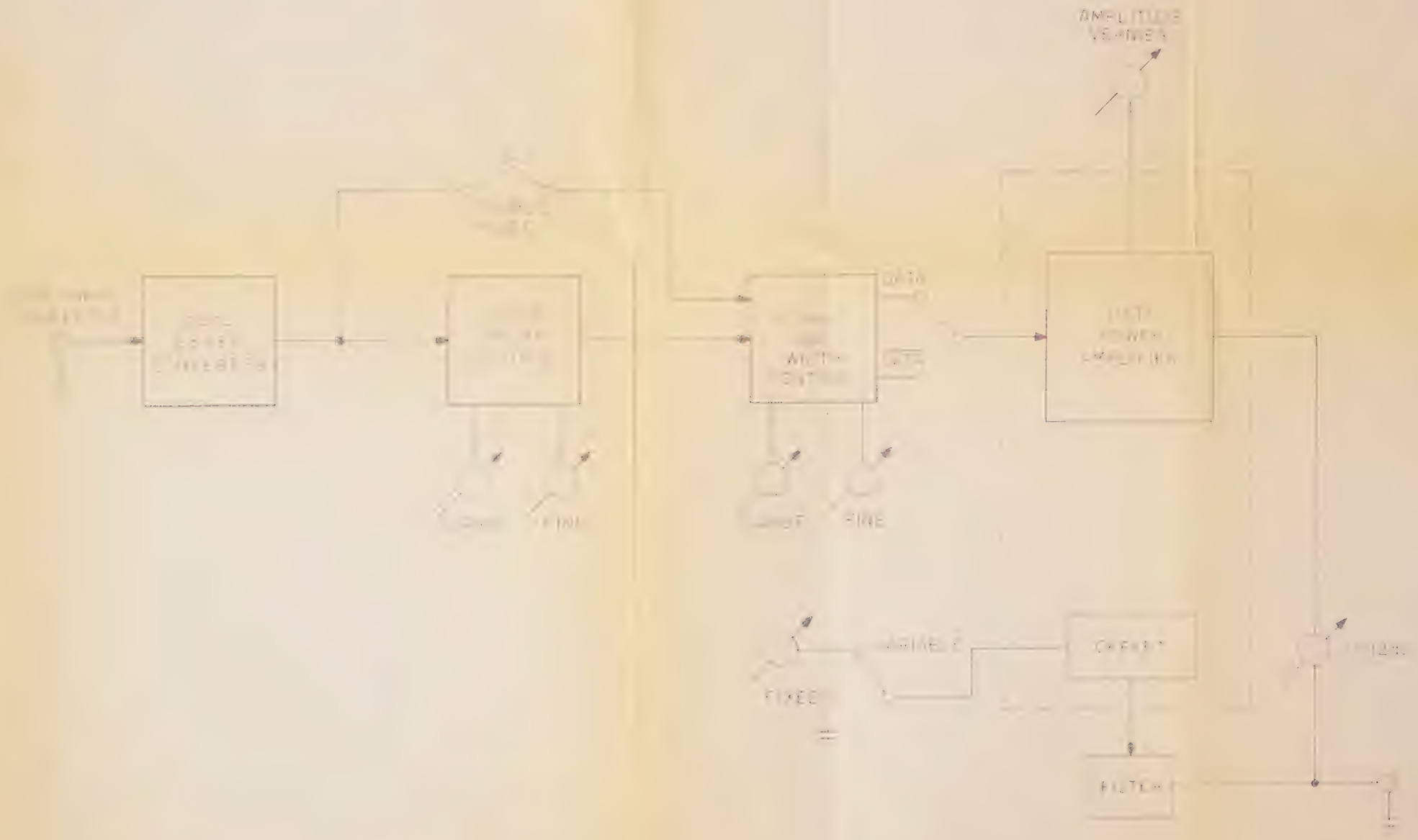
LIST OF ILLUSTRATIONS

MA-4 Block Diagram----------TCN-53239----------Figure 1

MA-4 Delay/Width Schematic---------TDJ-53988----------Figure 2

MA-4 Power Amplifier---------------TDJ-53216----------Figure 3

DATE	SYM	REVISION RECORD	DR	CK



TOLERANCES EXCEPT AS NOTED	TAU TRON INC.		
DECIMAL	TMI SERIE	SCALE	DRAWN BY / APPROVED BY
FRACTIONAL	TITLE: MECHANICAL DIAGRAM		
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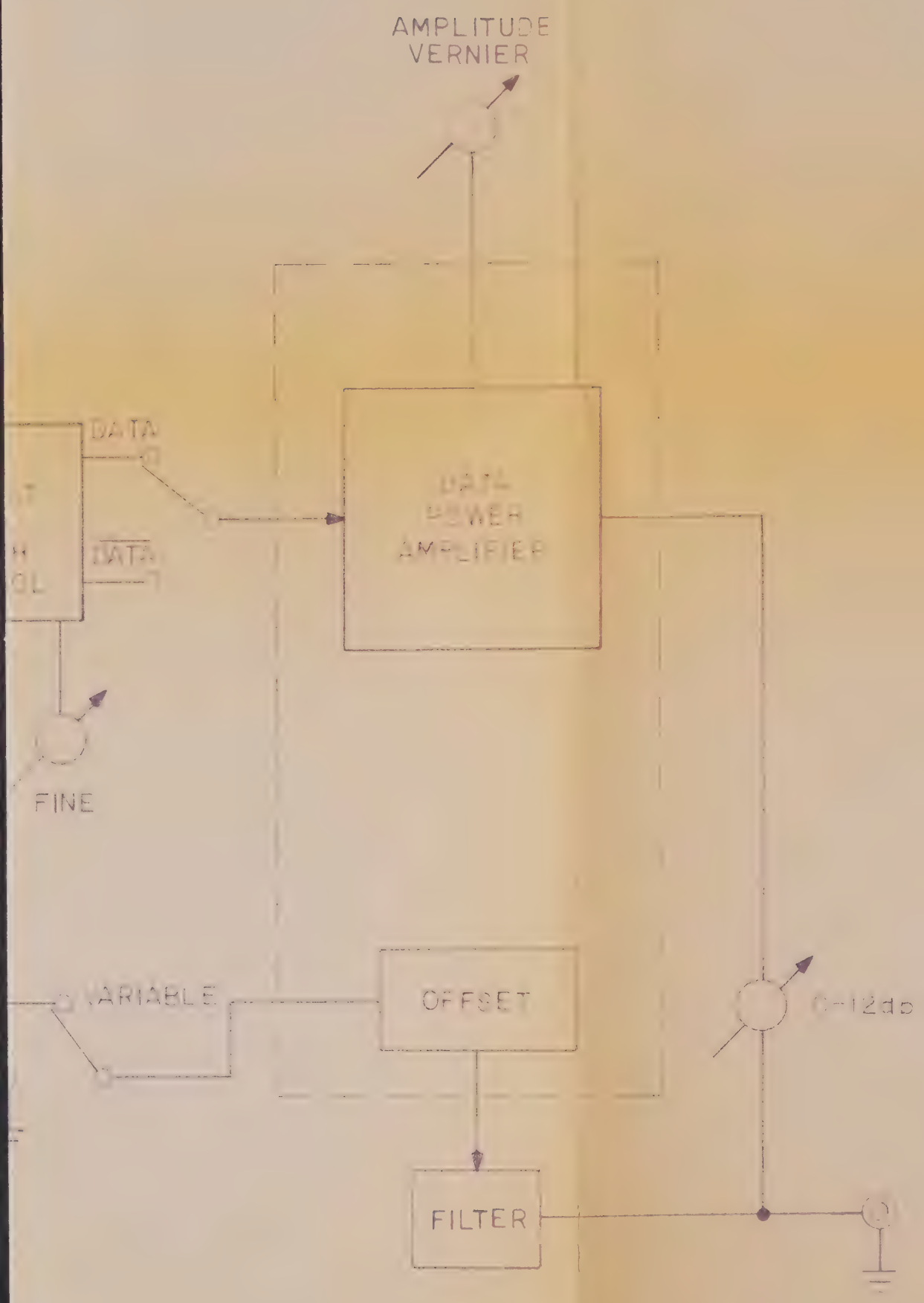

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FRACTIONAL . ~~—~~	TITLE MA-4 BLOCK DIAGRAM		
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DATE	SYM	REVISION RECORD	DR	CK

IC 203 MC10216

IC204 MC1662

FRONT PANEL SINGLE PULSE

SINGLE PULSE 5503

(FRONT PANEL)

R227 1K TRIMMER

DATA OUT (ECL) TO POWER AMP.

NOTES:

1. RESISTORS ¼W, 5%, UNLESS OTHERWISE NOTED.
2. CAPACITORS .01μf UNLESS OTHERWISE NOTED.
3. ~~Ω~~ RESISTANCE 470Ω ; TOLERANCE 5% POWER THROUGH R61
4. C218 THRU C225 .01μf CHIP CAPACITORS AT VARIOUS VOLTAGE POINTS.

REFERENCE DWG'S
PC BOARD 1T0270

TOLERANCES EXCEPTION NOTED			
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11/15/71	A	RELEASE DWG 53280		

R316 30 Ω 5% 1/2W
C304 .33 uF
-5.2V
R317 4.02K 1/2W
R318 499Ω 1/2W
-5.2V
C308 .01 uF
C309 .01 uF
MC 1010G or CA3080
R320 1.82K 1/2W
R321 1.82K 1/2W
R322 270Ω 1/2W
-5.2V
C310 .01 uF
C311 .01 uF
R323 1.82K 1/2W
R324 1.82K 1/2W
-5.2V
C312 .01 uF
R325 1.82K 1/2W
R326 1.82K 1/2W
-5.2V
C313 .01 uF
R327 1.82K 1/2W
R328 1.82K 1/2W
-5.2V
C314 .01 uF
R329 1.82K 1/2W
R330 1.82K 1/2W
-5.2V
C315 .01 uF
R331 1.82K 1/2W
R332 1.82K 1/2W
-5.2V
C316 .01 uF
R333 4.02K 1/2W
R334 499Ω 1/2W
-5.2V
C317 .01 uF
C318 .01 uF
R335 1.82K 1/2W
R336 1.82K 1/2W
-5.2V
C319 .01 uF
R337 1.82K 1/2W
R338 1.82K 1/2W
-5.2V
C320 .01 uF
R339 1.82K 1/2W
R340 1.82K 1/2W
-5.2V
C321 .01 uF
R341 1.82K 1/2W
R342 1.82K 1/2W
-5.2V

tau-tron
inc
11 Esquire Road, North Billerica, Mass. 01862
Tel: (617) 667-3874 TWX: 710-347-1570

WARRANTY

All Tau-Tron products are warranted against any defects in material and workmanship. This warranty applies for one year from the date of delivery for all Tau-Tron manufactured products. The warranty period for OEM products sold by Tau-Tron will depend on the original OEM warranty (consult factory for specific products). We will repair or replace products which, upon our examination, prove to be defective during the warranty period. NO OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING FITNESS FOR PURPOSE, MERCHANTIBILITY, OR OTHERWISE, IS GIVEN.

For any assistance, contact the factory and be prepared to provide Instrument Model and Serial Numbers and all details regarding the manfunction.

TAU-TRON, INC.
11 ESQUIRE RD.
NORTH BILLERICA, MA 01862
PHONE: (617) 667-3874

tau-tron
inc
11 Esquire Road, North Billerica, Mass. 01862
Tel: (617) 667-3874

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